

## NOTIFICATION SERVICE ON TRANSPORTATION NETWORK

## FIELD OF THE INVENTION

5 The invention relates to an information service for a user of a transportation system and an infrastructure for providing such a service.

## BACKGROUND ART

10 Transportation systems such as railroads, airlines, bus and freight services, ferries etc., are typically based on pre-determined time-tables that indicate intended arrival and departure times for pre-determined destinations. The scheduled flow of passengers and freight through such a system is often different from the actual flow, due to delays, re-directions, detours, canceled flights, etc. A change in the schedule of a transportation service can cause multiple delays in the schedules of other transportation service providers owing to the tight interlocking of transportation services supplied by different service providers in a transportation network covering a global network.

## SUMMARY OF THE INVENTION

15 From the user's point of view, unscheduled changes in one leg of a trip are more than a minor inconvenience, if only because of the time lost while waiting passively for the transportation service to resume its operation. If the user was notified as soon as possible of a potential or actual re-schedule or delay, the user himself/herself would be able to find alternatives to his/her destination or would be able plan activities in the meantime.

20 The inventors therefore propose to provide a personalized notification service to the user. A registered user is notified in real time, e.g., on the move, of updates regarding his/her itinerary via a personal device, e.g., a pager or cell phone. Notifications can be sent as, e.g., SMS  
25 messages, voice mails from help-desk operators or via a voice synthesizing server, etc. Preferably, the personalized service or the device also keeps track of bonuses relating to frequent-usage (e.g., frequent flyer miles) and of the user's travel or freight profile so as to optimize the value of the service as perceived by the user. Preferably, the notification service  
30 suggests one or more solutions to the individual user's transportation problem, e.g., by alerting the user to alternative transportation services available at a certain geographic location and within a certain time frame.



US 018038

An aspect of the invention is embodied in a method of providing a service to a user of a transportation system. The method comprises initiating the sending of a notification to a device, personal to the user, on a change in an itinerary of the user. The user preferably has registered his/her personal communication device with the service, or has received a dedicated communication device from the service. Preferably, the user can state his/her preferences regarding a modality of the notification. For example, the user prefers to receive a voice message, or an SMS message, or a detailed HTML page. Another modality option is the language used for the text notification: English, Japanese, Friesian, etc. Preferably, the service also provides personalized navigation information to the individual user to enable the user to find a relevant site in the transportation system. For example, the user receives directions to go from his/her current location to the relevant terminal or gate at an airport. This is believed to be a feature helpful to the user when last-minute gate changes or rescheduled flights leave the user little time to find the relevant boarding site. Also, the communication device can be used to let the user confirm to the service that the user is going to follow up on the alert or suggestion received. For example, the gate can be left open just for another more 5 minutes.

The service is useful to, e.g., frequent flyers, but also to other parties depending on the transportation system. For example, pick-up services such as limousine companies have chauffeurs and limousines that have to be present when the travelers arrive for whom the limo-service was ordered.

In an embodiment of the invention, the service supplies the communication device to the user upon the user having registered. In this manner a dedicated device is provided that is tailored to the needs of the user, and that can have additional applications. For example, the service provides a communication device that has a navigation module to enable the user to find a relevant site in the transportation system. The system comprises beacons, e.g., Bluetooth compliant, that let the user to communicate with the local system. In an airport, for example, the device receives information from the system, that depends on the current location in the system, e.g., air terminal. The system thus can guide the user to the relevant terminal or gate via the device that now serves as a navigational aid. It also can be made a guide to relevant sectors of the airport's parking garage that currently have parking space available, etc.

The communication device or data processing device is preferably used in combination with a personalized communication service provided to the user of the transportation system. The device has a wireless communication module for receipt of a notification, initiated by the service

provider regarding a change in an itinerary of the user. The device has a rendering module (e.g., a display monitor or loudspeaker) for rendering the notification to the user. The device may also have a navigation module to enable the user to find a relevant site in the transportation system. The navigation module is controlled by beacons forming an infrastructure of the transportation system to help the user find his/her position and the direction towards a desired site within the system.

The following documents are incorporated herein by reference:

- U.S. serial no. 09/635,548 (attorney docket US 0000107) filed 8/10/00 for Eugene Shteyn and Paul Rankin, for MOBILE MICRO PORTAL. This document relates to a method for enabling a user of a mobile communication device to receive a short-range wireless facilitation signal on the device. A beacon transmits the facilitating signal. When the user's device is within range of the beacon the facilitation signal initiates associating the facilitating signal with a service. The initiating leads conditionally to alerting the user to the service, depending on a user-profile, preferably stored at the mobile device. Accordingly, the user is enabled to get only information about services that are of interest to him/her as indicated by the user-profile. If the service associated with the facilitation signal matches the user-profile, the user gets alerted to the service via the device, e.g., via a text message generated on a display of the communication device. If the service does not match the profile, the device does not alert the user. The alerting text message can be generated in a way similar to paging or SMS (Short Message Service). SMS uses GSM communication and allows sending of text messages of up to 160 characters to mobile phones. Preferably, the user can program the device so that he/she is to be alerted through an audible signal if the service matches the user's profile. This way, the user does not have to keep an eye on the mobile communication device all the time. Preferably, the device can store the facilitation signals and/or the messages thus received for retrieval later on. Other mechanisms to alert the user can be used, e.g., a visual warning on the mobile communication device or a tactile warning through a vibration unit in the communication device as known from pagers, etc. Accordingly, alerts can be tactile (vibration), text, visual or audible. Different modalities, e.g., amplitudes or styles, can be used for different priorities within the current user's context. The context (filter) selection by the user may well control the modality of any alerts as well as what opportunities are alerted. Emerging wireless PAN/LAN network protocols, such as IrDA, Bluetooth and HomeRF, enable mobile devices to become a dynamic part of a home-, office- or community network. Especially a mobile phone equipped with, e.g., Bluetooth-compatible hardware and software, can

communicate directly with a local device and/or local service. In general, each network component can be a service-offer-point (SOP). The network comprises, for example, a home network, an office network, or an infrastructure of components in a public place such as a shopping mall, a street, an airport, a local town network or community network, etc. Each component has a beacon that transmits or broadcasts a facilitation signal associated with meta-  
 5 ata relating to information content or services provided at, or represented by, the component or associated with the network. The beacon's range is typically short-range as with Bluetooth.

## BRIEF DESCRIPTION OF THE DRAWING

10 The invention is explained below, by way of example, and with reference to the accompanying drawing, wherein:

Fig.1 is a flow diagram of events occurring in a scenario of the invention;

Fig.2 is a block diagram of a dedicated communication device for usage within the notification service.

## DETAILED EMBODIMENTS

As discussed above, the invention relates in particular to a service provided to a user of a transportation system, such as an airline. The service initiates sending a notification to a device, which is personal to the user. The notification informs the user, or causes the user to be informed  
 20 about a change in an itinerary. This kind of service enables the user to change plans accordingly, e.g., reserve another flight, book a hotel, go for a meal, or give a call to person at the destination who is to pick up the user upon arrival, etc.

The service is also relevant to other parties or users depending on the transportation system, such as pick-up services that are scheduled to pick-up passengers upon their arrival at the  
 25 airport, relatives of the traveler who await his/her arrival at the destination, etc. The service preferably also takes care of notifying these relevant other parties as specified by the user who registered for the flight.

Fig.1 is a flow diagram 100 illustrating events in a scenario according to the invention. In step 102, the user makes reservations for a flight from boarding location A to final destination B with a certain airline company. The scheduled boarding time is T1, the scheduled time of arrival  
 30 is T2. The flight is indirect. That is, the user has to make a stop-over at airport C in-between A and B, and get a connecting flight to on the final leg of the itinerary to destination B.

In step 104, the user is registered in the notification system for the service to be notified of delays, or other unforeseen changes in this specific itinerary. These changes are typically beyond control of the airline company. The user may specify whom to notify, e.g., him/herself, home, secretary, pick-up service, etc. In the current example, it is assumed that the user is given a  
 5 dedicated personalized communication device by the airline company or travel agency to which the notification is to be sent. The user has also specified that the limousine service, scheduled for pick-up at destination B, and the hotel at destination B is to be notified of selective messages affecting the itinerary.

10 In step 106, the user leaves home in a taxi on his/her way to the boarding location A (airport) in order to catch the flight with scheduled boarding time T1.

In step 108, while the user is his/her way to the airport, the airline company gets notified that the flight from intermediate location C to final destination B has to be delayed due to traffic congestion and bad weather in and around location C.

15 In step 110, the user gets notified by the service of this tentative delay. Also, the user is given information about alternative flights still available from boarding location A to destination B avoiding location C.

In step 112 the user decides to change his/her flight plan accordingly and registers via the dedicated device and a return path for an alternative flight to destination B, scheduled arrival time T3.

20 In step 114, the service notifies the limo-service of the changed itinerary and the new scheduled arrival time T3. As the scheduled arrival time T3 does not interfere with the check-in time at the hotel at destination B, the hotel does not need to be notified of the new itinerary.

25 After arrival at the airport, the user checks in for another flight according to the alternative chosen, where the tickets have already been prepared, and the process further carries on as usual. As the limo-service has got notified ahead of time, the chauffeur does not have to wait, and the user does not have to get involved in notifying them.

The personal device comprises, e.g., the user's personal communication device(s) such as a cellphone and pager, laptop with wireless modem, etc., or a dedicated communication device  
 30 adapted to the type of service provided. In the latter case, the dedicated device is, e.g., a communication device useable for, preferably bi-directional communication between the service's help-desk and the user. If the service is provided via a human operator, the device may

comprise a cellphone dedicated to enable the user to communicate with the operator. For example, the device cannot be used to communicate with other parties having no relationship with the service. The user-interface can therefore have only a few (hardware or software) buttons or keys to initiate the communication. If the service is provided by a fully automated system to ensure efficiency and timely actions, the dedicated device preferably has SMS or e-mail capabilities at least for receiving messages. If a response is required from the user, this is achieved through, e.g., the user checking-off in graphical user interface (GUI) the options selected, whereupon the checked-off confirmation is registered by the service and processed. It is noted that the dedicated device is preferably a lean device, so as not to trouble the user with carrying it around. Alternatively, the user can be given an alert to initiate him/herself the retrieval of the electronic notification, e.g., via an email or a pointer to an interactive Web-document, to be retrieved via a wireless modem and PDA with a browser, for getting notified of changes and selecting alternatives.

Fig.2 is a block diagram of a handheld dedicated device 200 that supports various aspects of the service described above. Device 200 comprises as a user-interface an LCD display 202 for displaying to the user text-based messages regarding changes in the itinerary and/or the alternative itineraries currently available to the user. The user-interface further has a navigation button 204 to select in a menu of predefined format the relevant information to be sent back to the service provider 206. Button 204 controls, for example, an "up" and a "down" selection depending on the user's actuation, for browsing through the options listed. Alternatively, button 204 lets the user navigate through the options in a circular manner so that only jumping in one direction is sufficient. Upon selection, the user confirms the selection to the service provider by using "OK" - button 208.

Device 200 communicates with service provider 206, e.g., based on known technologies such as an SMS protocol as with pagers, or via email or voice mail as with cellphones. Once within the airport, device 200 can use short range communication such as Bluetooth when the service has provided an infrastructure of beacons. This is also helpful to guide the user to the proper check-in terminal, the proper exit to find the taxi's, etc. The usage of Bluetooth and comparable technologies is discussed in U.S. serial no. 09/635,548 (attorney docket US 0000107) mentioned above.

Within the context of this invention, reference is made to the following U.S. patent documents, herein incorporated by reference:

- U.S. serial no. 09/619,426 (attorney docket PHA 23,387V) filed 7/19/00 for Jan van Ee for HAND-HELD WITH AUTO-ZOOM FOR GRAPHICAL DISPLAY OF WEB PAGE. This document relates to an information processing apparatus that has an input for receiving data from an external resource, e.g. the Internet, a display, and a data processing system. The system is connected to the input and to the display. The system processes the data upon receipt and renders on the display an image corresponding to the data received. The apparatus has a touch screen for enabling a user to interact with the apparatus. The system is operative to enable the user to select via the touch screen a portion of the image when displayed at a first scale. Upon the portion being selected the system renders the selected portion on the display at a second scale larger than the first scale (zoom-in). The portion selected corresponds to a location on the touch screen. The invention thus allows the user to perceive the graphical information of the image regardless of the display size. The invention is especially interesting to handhelds, such as PDA's, palmtops, mobile phones, web pads (thin clients with browsing capabilities), etc., because the size of a handheld's display is necessarily small due to the required form factor and weight limitation. The ubiquitous information access via a browser is a great asset for Internet-enabled handhelds. (comprising a wireless modem), as not only text pages but also, e.g., still pictures (e.g., jpeg), streaming video, web page with hyperlinks (e.g., HTML) and java animation are now within reach of these devices whose screen real estate needs not be the limiting factor anymore.

- U.S. serial no. 09/464,855 (PHA 23,875) filed for Willem Bulthuis et al.) for HAND-EAR USER INTERFACE FOR HAND-HELD DEVICE. This document relates to a hand-held information processing device, such as a mobile phone, has a thumb wheel or another step-through component that lets the user scan a linear or circular array of options. Each respective one of the options is represented by a respective audio output that gets played out when the wheel is turned a notch up or down. This enables the user to select an option with one hand and without having to look at the device. It also allows for a form factor smaller than that of a conventional mobile phones since a keypad is not needed for entering digits to make a call from a personalized directory.